Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Petition Filed by the Land Mobile Communications Council to Reallocate Portions of the Amateur 70 cm Band to Land Mobile Use	)	RM-9267

COMMENTS OF THE RADIO AMATEUR SATELLITE CORPORATION

The Radio Amateur Satellite Corporation (AMSAT) respectfully submits these comments opposing the petition filed by the Land Mobile Communiccations Council.

BACKGROUND

1. AMSAT, a not-for-profit District of Columbia corporation established in 1969, is the principal membership organization of the amateur-satellite community in North America. Our membership currently numbers about six thousand. Together with over thirty of our affiliated organizations throughout the world, we have constructed, launched and operated over two dozen satellites to date in the amateur-satellite service, of which many are presently in operation. These currently operational spacecraft include one high-altitude, Molniya-type orbit transponder satellite capable of sustaining two-way communication over terrestrial paths well in excess of 10,000 miles (AMSAT-OSCAR 10), several low-earth-orbit (LEO) digital store-and-forward packet radio satellites, scientific and educational payload satellites, LEO analog transponder satellites, and spacecraft featuring combinations of these types of payloads.

2. Additional satellites for the amateur-satellite service are planned, or are presently under construction, by AMSAT and its affiliate organizations in various countries. Many of these groups are associated with universities or have access to government or industry facilities in their countries. Indeed, owing to the worldwide and cooperative nature of amateur radio, the construction of satellites for the amateur-satellite service has emerged as an important means of technology transfer to developing countries. One not-for-profit organization, Surrey Satellite Technologies Ltd., affiliated with the University of Surrey in the United Kingdom; has built or aided in the construction of a number of

such satellites. Over the next ten to twenty years, it is certain that further proliferation of this highly beneficial activity will take place, provided suitable spectrum is maintained for its use.

3. AMSAT itself is currently working with amateur satellite construction groups in nearly a dozen countries to build the fourth and most advanced in a series of elliptical orbit amateur satellites called "Phase 3D". This spacecraft is expected to be launched later this year on an Ariane launch vehicle. One of the principal frequency bands that Phase 3D will employ, is the 435 - 438 MHz segment of the 70 cm band. The spacecraft includes both a transmitter and a receiver in this band, either of which can be switched to use a high gain array or an omni-directional antenna.

4. Another important project, which is destined to make heavy use of the 435 - 438 MHz amateur-satellite service allocation is amateur radio involvement on the International Space Station (ISS). Amateur radio has been accepted as a payload for ISS and AMSAT, along with amateur groups from a number of countries, is currently actively pursuing designs for equipment to go aboard the Station.

5. Unlike commercial satellite services for which the use of geostationary spacecraft is economically feasible and common, the amateur satellite service currently utilizes satellites in low Earth orbits or highly elliptical orbits, which serve all, or most, of the globe with one set of uplink and downlink frequencies. For this reason, amateur satellite frequency allocations must be coordinated internationally so that they are available for use on a worldwide basis.

6. Amateur satellites are also completely different from satellites built for government or commercial applications in another way. In the case of commercial or government satellites, while the spacecraft is being constructed and prepared for launch, suitable ground station equipment is being developed and deployed. Usually, both of these are funded and directed by the same company or government agency. This assures that the ground equipment will be in place when the space segment comes on line and the two will be compatible with one another. This is not the case with amateur satellites. Amateur satellites are constructed by a specific amateur group such as AMSAT, or a collection of such groups.

In planning the satellite, the constructors attempt to understand the current and future capabilities and needs of individual amateurs throughout the world, not just in their own country. This often means that they must compromise in the design of the satellite, frequently choosing lower frequency bands and lower-speed data rates than would be optimal otherwise. This creates somewhat of a dilemma for amateur satellite builders. If the lower bands are too crowded and the higher bands present too great a challenge to people in poorer countries, the use of intermediate bands such as 70 cm (435 - 438 MHz) becomes mandatory.

7. The intense crowding taking place on the lower amateur bands available to amateur satellites, necessitates the use of the higher bands for them. Particularly bad is the situation in the 144 - 146 MHz band, in which the amateur-satellite service is co-primary with the amateur service. This is the only portion of the VHF spectrum presently allocated to the amateur satellite service by the ITU. Because of intense usage by other amateur applications, the only part of this band regularly used by the amateur satellite service is 145.8 - 146.0 MHz. Co-channel and adjacent-channel interference, a direct result of the intense crowding, is increasingly making the band difficult to use for satellites, especially for the relatively weak signal satellite downlinks. In addition to legitimate amateur use of the band; the ready availability of inexpensive equipment, intended for the amateur market, has resulted in extensive use of this band by non-amateurs for personal and commercial communications in many countries, especially in Central America, Asia and the Pacific Rim, despite ITU regulations to the contrary. First-hand observations by radio amateurs flying in space aboard the Space Shuttle and MIR have confirmed that this is a significant and growing problem. All of this crowding in the 2 meter band, makes migration to higher frequencies all the more urgent. For this reason, increased emphasis must be placed on their use, for future amateur satellites, especially 435 - 438 MHz.

8. Over a dozen presently operating satellites currently utilize the 435 - 438 MHz segment of the 70 band. A significant portion of that current satellite activity involves store and forward digital message traffic originating in the amateur packet network system. Thus, many amateurs, who may not even know that their messages are going through satellites, are utilizing satellite communication, whether they know it or

not.

9. Two internal problems facing amateur radio are also important here. They are the proliferation of modes of operation, many inherently wideband in nature, and the increasing number of amateur radio operators resulting from the institution of the code-free license. For example, several manufacturers currently offer low cost amateur television transmitters for the 420-450 MHz band. As no such amateur television equipment is manufactured commercially, for any of the amateur bands above 450 MHz, this band receives the brunt of amateur television operation. Many of these commercial amateur TV transmitters, and most home constructed units, transmit signals 8 MHz in width (both sidebands). Thus, their operation often causes interference to other amateur activities, including amateur satellites in the 435 - 438 MHz amateur-satellite service band.

Effect of Favorable Action by the Commission on the LMCC Proposal

10. AMSAT contends that, if the LMCC proposal for reallocation, or sharing, of 420 - 430 MHz and/or 440 - 450 MHz, is implemented, even more of the aforementioned amateur television operation, as well as other amateur activity such as FM simplex and remote bases, will be forced into the 435 - 438 MHz amateur-satellite service segment of the 70 cm band.

11. Indeed, any spectrum lost by amateur radio puts additional pressure on remaining spectrum. Proof that the LMCC proposal seriously threatens the amateur-satellite service segment at 435 - 438 MHz, by causing other amateur activates to crowd into what remains of the band, can be found in the fact that satellite operation in that segment has already been impacted by the loss of 420 - 430 MHz in some parts of the country, as well as the heavy use of amateur repeaters in the 440 - 450 MHz segment. These factors have already caused an increasing number of amateur television operators to use frequencies in the vicinity of 435 MHz. Thus, it is quite logical to conclude that complete loss of 420 - 430 and/or 440 - 450 MHz; or substantial sharing of them with PMRS operators, will have a an even greater impact on satellite operations in this band.

12. AMSAT is concerned that sharing between PMRS operators and terrestrial amateur communication in the proposed band segments is not feasible. As

stated in 14 below, it would be expected that the PMRS operators would employ conventional FM, just as do the amateur voice repeaters in that part of the spectrum. Thus, each would occupy similar bandwidths. In many parts of the U.S. particularly the large cities, the amateur band from 440 - 450 MHz is already completely filled with amateur voice repeaters. It is certain that these same cities are the areas in which PMRS is especially in need of additional space, and thus would be bear the brunt of any sharing that might be attempted.

13. The 430 - 420 MHz segment, in the portions of the country where it is available, is widely used by amateurs for voice and data links, as well as for amateur television. It is almost certain that amateur repeaters, links and amateur television operators, experiencing interference from PMRS operators, operating in the proposed band segments, would seek to move to the 430 - 440 MHz segment, including the 435 - 438 MHz amateur-satellite service segment. This kind of situation has already been shown to be a significant problem in the many other countries of the world; where only 430 - 440 MHz, or parts thereof, is available for amateur operation, and all modes must share this narrow band of frequencies. In AMSAT's opinion, acceptance of the LMCC proposal, will guarantee that the same bad situation will exist here in the U.S. to an even greater extent than it does today.

Alternative Approaches to Meeting LMCC Perceived Needs

14. The LMCC petition is unclear as to how PMRS would make use of the spectrum they are seeking. Nothing regarding the technology that would be employed is covered in their filing. One can only assume that conventional FM would be utilized. There is no discussion of the use of more modern technology such as spread spectrum (SS) or amplitude compandored single sideband (ACSSB). Monitoring by AMSAT members has shown that ACSSB equipment is being used in the 220 - 222 MHz band reallocated from the amateur service several years ago. Thus, it would appear that suitable ACSSB equipment is available.

15. AMSAT suggests that consideration be given to placing ACSSB channels between existing FM channels in the bands already allocated to PMRS. Eventually, all land mobile operation could be converted to ACSSB, multiplying the number of available channels by a factor of 4 or 5. Alternatively, the use of SS systems, overlaying existing PMRS allocations

offers another possibility.

Conclusions and Recommendations

16. Even though the proposal offered by LMCC does not directly address amateur -satellite service allocations, AMSAT believes that its implementation will have a major impact on amateur satellite operation in this important band, both in this country and abroad.

17. Furthermore, AMSAT contends that, in this instance, as in any other situation which might Impact a band allocated to the amateur-satellite service; consideration must be given to the potential impact that any action taken might have in the rest of the world, as well as this country.

18. For the reasons cited, the Radio Amateur Satellite Corporation strongly urges that the Commission not consider reallocating, the frequency bands proposed by LMCC to PMRS, or allowing sharing by PMRS with current amateur operations in these bands. Further, we urge that LMCC explore other frequency band alternatives and/or newer technologies that would permit them to meet their needs using the frequencies already allocated to them, before they seek the use of amateur frequencies.

RESPECTFULLY SUBMITTED,

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